CLAIMS

1. An optical device comprising at least a light receiving element and a hologram element, the hologram element diffracting a plurality of incident beams having different wavelengths, the light receiving element having light receiving regions to receive the diffracted beams,

the light receiving element having a plurality of light receiving regions to receive the incident beams of different wavelengths diffracted at different angles through the hologram element, the light receiving regions receiving the incident beams of different wavelengths, respectively,

the optical device further comprising an operation means that processes output signals provided from the plurality of light receiving regions,

when one of the light receiving regions is receiving an incident beam of one of the wavelengths, the operation means carrying out an operation according to an output signal from the one light receiving region and an output signal from another one of the light receiving regions, to detect an unnecessary light component.

2. The optical device as set forth in claim 1, wherein

the plurality of light receiving regions have a nearly equal light receiving area.

3. The optical device as set forth in any one of claims 1 and 2, wherein, when the wavelength of an incident beam is one of first and second wavelengths,

if a first light receiving region is receiving an incident beam of the first wavelength, the operation means carries out an operation of (S1 - S2) based on an

output signal S1 from the first light receiving region and an output signal S2 from a second light receiving region, to detect an unnecessary light component, and if the second light receiving region is receiving an incident beam of the second wavelength, carries out an operation of (S2 - S1) based on an output signal S2 from the second light receiving region and an output signal S1 from the first light receiving region, to detect an unnecessary light component.

4. The optical device as set forth in any one of claims 1 and 2, comprising, when the wavelength of an incident beam is one of first and second wavelengths,:

wavelength determination means for determining whether the wavelength of an incident beam is the first wavelength or the second wavelength; and

polarity switching means for inverting the polarity of an output signal from the operation means according to a result of determination made by the wavelength determination means,

the operation means carrying out an operation of (S1 - S2) based on an output signal S1 from a first light receiving region for receiving an incident beam of the first wavelength and an output signal S2 from a second light receiving region for receiving an incident beam of the second wavelength,

the polarity switching means providing a result of the operation of (S1 - S2) as a detection signal representative of an unnecessary light component without inverting the polarity of the output signal from the operation means if the wavelength of the incident beam is the first wavelength, and if the wavelength of the incident beam is the second wavelength, inverting the polarity of the output signal from the operation means and providing (-1) × (S1 - S2) as a detection signal representative of an unnecessary

light component.

5. The optical device as set forth in any one of claims 3 and 4, wherein at least part of the operation means, wavelength determination means, and polarity switching means is integrally formed on a substrate on which the light receiving element is formed.

6. The optical device as set forth in any one of claims 1 to 5, wherein incident beams to the optical device include a reflected main beam that has irradiated an information recording medium to read main information from the information recording medium and been reflected by the information recording medium and two reflected sub-beams that have irradiated the information recording medium to conduct a tracking operation of a recording track on the information recording medium and been reflected by the information recording medium;

the light receiving element has reflected-main-beam receiving regions to receive reflected main beams of the different wavelengths diffracted at different angles through the hologram element, respectively, and reflected-sub-beam receiving regions to receive reflected sub-beams of the different wavelengths diffracted at different angles through the hologram element, respectively; and

when one of the reflected-main-beam receiving regions is receiving an incident beam of one of the wavelengths, the operation means carries out an operation according to an output signal from the one reflected-main-beam receiving region and an output signal from another of the reflected-main-beam receiving regions, and when one of the reflected-sub-beam receiving regions is receiving an incident beam of one of the

wavelengths, the operation means carries out an operation according to an output signal from the one reflected-sub-beam receiving region and an output signal from another of the reflected-sub-beam receiving regions, to thereby detect an unnecessary light component.

7. The optical device as set forth in any one of claims 1 to 5, wherein

incident beams to the optical device include a reflected main beam that has irradiated an information recording medium to read main information from the information recording medium and been reflected by the information recording medium and two reflected sub-beams that have irradiated the information recording medium to conduct a tracking operation of a recording track on the information recording medium and been reflected by the information recording medium;

the light receiving element has reflected-main-beam receiving regions and reflected-sub-beam receiving regions, the reflected-main-beam receiving regions commonly receiving a reflected main beam without regard to the wavelength of the main beam, the reflected-sub-beam receiving regions receiving reflected sub-beams of the different wavelengths diffracted at different angles through the hologram element, respectively; and

when one of the reflected-sub-beam receiving regions is receiving an incident beam of one of the wavelengths, the operation means carries out an operation according to an output signal from the one reflected-sub-beam receiving region and an output signal from another of the reflected-sub-beam receiving regions, to detect an unnecessary light component.

8. The optical device as set forth in any one of claims 1 to 7, wherein

the hologram element is divided into two regions along a straight dividing line;

when a light beam to read information from an information recording medium irradiates the information recording medium, is reflected by the information recording medium, and is made incident to the hologram element, the dividing line halving the hologram element into the two regions is in parallel with a recording track of the information recording medium when mapped on the information recording medium, and the hologram element diffracts the reflected beam and halves the reflected beam in a direction orthogonal to the recording track in terms of an optically mapped image.

9. The optical device as set forth in any one of claims 1 to 8, wherein

the wavelength of an incident beam is close to one of the first wavelength of 790-nm band and second wavelength of 660-nm band.

10. The optical device as set forth in any one of claims 1 to 9, wherein

at least one of a light source for emitting light of the first wavelength and a light source for emitting light of the second wavelength is integrally formed on a substrate on which the light receiving element is arranged.

11. An optical pickup apparatus comprising:

the optical device as set forth in any one of claims 1 to 10; and

a light source for emitting light of the first wavelength and a light source for emitting light of the second wavelength,

light from the light sources irradiating an information recording medium,

reflected beams from the information recording medium being made incident to the optical device to read information from the information recording medium.

12. An optical pickup apparatus comprising:

the optical device as set forth in any one of claims 1 to 10;

a first laser source for emitting a laser beam of the first wavelength;

a first diffraction grating for dividing the laser beam of the first wavelength from the first laser source into a main beam and two sub-beams;

a second laser source arranged in the optical device, for emitting a laser beam of the second wavelength; and

a second diffraction grating arranged in the optical device, for dividing the laser beam of the second wavelength from the second laser source into a main beam and two sub-beams,

the laser beams emitted from the laser sources irradiating an information recording medium, reflected beams from the information recording medium being made incident to the optical device, the reflected main beams from the information recording medium being used to read main information from the information recording medium, the reflected sub-beams from the information recording medium being used to read a tracking error signal from the information recording medium.

13. An optical pickup apparatus comprising:

the optical device as set forth in any one of claims 1 to 10;

a first laser source arranged in the optical device, for emitting a laser beam of the first wavelength;

a first diffraction grating arranged in the optical device, for dividing the laser beam of the first wavelength from the first laser source into a main beam and two sub-beams;

a second laser source for emitting a laser beam of the second wavelength; and

a second diffraction grating for dividing the laser beam of the second wavelength from the second laser source into a main beam and two sub-beams,

the laser beams emitted from the laser sources irradiating an information recording medium, reflected beams from the information recording medium being made incident to the optical device, the reflected main beams from the information recording medium being used to read main information from the information recording medium, the reflected sub-beams from the information recording medium being used to read a tracking error signal from the information recording medium.